

Delta Vision

## Context Memorandum: Suisun Marsh

This context memorandum provides critical information about the Suisun Marsh to support policy making. As they are developed, the context memos will create a common understanding and language about the critical factors in establishing a Delta Vision.

This is an iterative process and this document represents the beginning of a dialogue with you about how best to understand these lessons and to inform recommendations by the Delta Vision Blue Ribbon Task Force. You have two weeks to submit comments that may be incorporated into the next iteration.

You may submit your comments in two ways: either online at [dv\\_context@calwater.ca.gov](mailto:dv_context@calwater.ca.gov) or by mail. If you are using mail, please send your comments to: Delta Vision Context Memo: Suisun Marsh, 650 Capitol Mall, 5<sup>th</sup> Floor, Sacramento, CA 95814.

Your attributed comment will be posted on the Delta Vision web site (<http://www.deltavision.ca.gov>). Please cite page and line number with specific comments; general comments may be keyed to sections.

Your participation in this iterative process is valuable and important and is greatly appreciated. Thank you for your comments.

*This context memo was prepared by the Suisun Marsh Charter Principal Agencies:*

*U.S. Fish and Wildlife Service*

*California Department of Fish and Game*

*U.S. Bureau of Reclamation*

*California Department of Water Resources*

*National Oceanic and Atmospheric  
Association,  
National Marine Fisheries Agency*

*CALFED Bay-Delta Authority*

*Suisun Resource Conservation District*

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

## Section 1. Executive Summary

### The Suisun Marsh is a critical part of the Bay-Delta Estuary

The Suisun Marsh is one of the largest contiguous estuarine wetland complexes remaining in North America, and is an important nursery for fish, a wintering and nesting area for waterfowl and waterbirds of the Pacific Flyway, and an essential habitat for plants, fish and wildlife, including several listed and sensitive species. Suisun Marsh managed and tidal wetlands are brackish. These wetlands are a critical part of the San Francisco Bay-Delta estuary and a critical component of any strategy for managing the Delta-Suisun ecosystem.

The physical configuration of the levees, sloughs, and bays combined with Delta outflow, tidal flow, and northern creek inflows influence the natural salinity gradients both within the marsh and within the Delta waterways that converge at the marsh. The X2 salinity standard is measured at this convergence.

The wetland areas of Suisun Marsh are a mosaic of private and public ownerships, with the private landowners controlling more than 60 percent. Management and maintenance of these habitats and the levees protecting them are typically funded by local landowners including Reclamation Districts, private individuals and the California Department of Fish and Game. More than 200 miles of Suisun Marsh exterior levees receive little or no public financial assistance for levee maintenance and repairs. However, these levees protect local, regional, and State infrastructure, natural resources, and delta water quality.

**Existing policies have effectively protected the marsh from most urbanization, but could be improved to ensure that the marsh is sustained. The values protected by existing Suisun Marsh policies are important to the Delta Vision process.**

There are a number of key natural and anthropogenic drivers that affect conditions and change in Suisun Marsh. Taking actions in Suisun or elsewhere that affect Suisun requires a clear understanding of these drivers and how they manifest their effects on the Marsh. Salinity and water flow are the two most significant environmental drivers affecting all aspects of Suisun Marsh ecology. The Marsh's geometry is a strong environmental driver on salinity in the western Delta. These long-known facts are reflected in the suite of plans and policies pertaining to Suisun Marsh management.

Actions in the Suisun Marsh are governed by a myriad of legislative and administrative policies and carried out by public agencies. The two most significant policies have been the 1977 Suisun Marsh Preservation Act and the State Water Resources Control Board water rights decisions. The 1977 Suisun Marsh Preservation Act was passed by the State Legislature which declared that the Suisun Marsh represents a unique and irreplaceable resource to the people of the State and nation;

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 and it is the policy of the State to preserve and protect a resource of this nature for the  
2 enjoyment of the current and future generations. The 1978 Water Rights Decision 1485  
3 set standards for water quality in the Marsh and required DWR and the USBR to  
4 develop and implement a plan to meet these standards.

5  
6 Historically, the levees of Suisun Marsh have been excluded from funding either  
7 through the Delta Levee Subventions program, legislation, and/or the general bonds  
8 approved by voters. Under the proposed Suisun Marsh Plan maintaining and improving  
9 levee integrity is seen, by stakeholders and agencies, as a component of restoration and  
10 enhancement of ecosystem and wetland values, and contributing to the protection of  
11 Delta drinking water quality. Existing policies should be modified to include Suisun  
12 levees.

13  
14 **Considerable work is already done or underway to define the future of Suisun**  
15 **Marsh, in a context that is consistent with the Delta Vision mandate.**

16  
17 The Habitat Management, Preservation, and Restoration Plan for Suisun Marsh  
18 PEIR/EIS (Suisun Marsh Plan) is being developed by The Suisun Marsh Charter Group  
19 Principal Agencies, a team of local, State and federal agencies. The Suisun Marsh Plan  
20 is intended to protect and enhance Suisun Marsh's contributions to the vital Pacific  
21 Flyway plus existing wildlife and endangered species habitats, maintain and improve  
22 strategic exterior levees, restore tidal marsh and other ecosystems, and improve water  
23 quality. The goals of the Suisun Marsh Plan are consistent with the Delta Vision  
24 mandate.

25  
26 The Suisun Marsh Plan can be implemented as a distinct element of any future  
27 vision, conservation strategy or implementation plan for the Delta and Suisun. This plan  
28 will identify regional tidal restoration targets and managed wetland enhancement and a  
29 program to maintain and improve levees that are required to protect existing  
30 infrastructure, ecological values and water quality. The planning process will result in a  
31 draft programmatic EIS/EIR (PEIS/EIR), with action specific elements in Spring 2008.  
32 When approved this plan will expedite implementation of immediate actions in Suisun,  
33 but will not preclude additional actions in the future.

34  
35 The body of knowledge about the physical, biological, and hydrologic conditions and  
36 processes of Suisun has been advancing rapidly in recent years. As part of developing  
37 the Suisun Marsh Plan, the Principal Agencies initiated preparation of a suite of  
38 conceptual models to draw from the body of science and engineering in the Marsh,  
39 informed by a March 2004 Suisun Marsh Science Workshop.

40  
41 The Suisun Marsh Plan will consider four alternatives, including a No Action  
42 Alternative, with the primary difference among them being the extent of tidal marsh  
43 restoration and managed marsh enhancement. All of the alternatives will include

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 considerations of existing exterior levee maintenance, ongoing managed wetlands  
2 operations, interior levee maintenance to achieve either the tidal marsh objectives or the  
3 managed marsh enhancement, continuation of the Suisun Marsh Preservation  
4 Agreement, and obtaining Corps of Engineers authorization for on-going maintenance.

5  
6 Under the proposed Suisun Marsh Plan, habitat improvements, such as tidal marsh  
7 restoration, would be balanced by improvements to managed wetlands that benefit  
8 waterfowl. This balances the need of endangered species recovery with the existing  
9 managed wetland habitat values and functions.

10  
11 The Suisun Marsh Plan will include an Adaptive Management Plan and performance  
12 measures to guide future monitoring and to allow for assessment of restoration  
13 effectiveness. Projects implemented in the marsh under this plan will be based on the  
14 best available science and experience at the time, but monitoring and applying new  
15 understanding gained from each project is crucial to improving the effectiveness of  
16 subsequent actions.

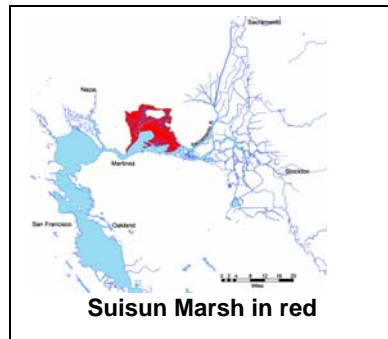
## 17 18 *Section 2. Setting the Issue in Policy Terms*

### 19 20 **Introduction to the Suisun Marsh**

21  
22 Suisun Marsh is a critical part of the San Francisco Bay-Delta estuary and a critical  
23 component of any strategy for managing the Delta-Suisun ecosystem. It is the largest  
24 contiguous brackish water wetland remaining on the west coast of North America. The  
25 variable brackish salinity of the Marsh translates to one of the most diverse wetland plant  
26 communities in the Estuary. The Marsh provides essential habitat for hundreds of fish  
27 and wildlife species, including many that are either federal and/or State listed threatened  
28 or endangered (Table 1). Suisun Marsh is primarily located in southern Solano County,  
29 between San Francisco Bay and the confluence of the Sacramento and San Joaquin  
30 rivers in the western Delta (Figure 1). Salinity and water flow are the two most significant  
31 environmental drivers affecting all aspects of Suisun Marsh ecology. The Marsh's  
32 geometry also is a strong environmental driver on salinity in the western Delta.

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007



**Figure 1. Suisun Marsh Location Map and Planning Area.** The Marsh is bordered on the east by the Montezuma Hills, on the south by Suisun Bay, on the west by Interstate 680, and on the north by State Highway 12, Fairfield, and Suisun City.



**Suisun marsh planning area**

1 The Suisun Marsh still remains wetland area and open space owing to a history of  
2 political and policy activism on the part of local landowners who sought to protect the  
3 wetland values of the marsh in the early 1970's. In 1974, the California Legislature  
4 adopted the Suisun Marsh Preservation Act. The Suisun Marsh Preservation Act directs  
5 the San Francisco Bay Conservation and Development Commission (BCDC) and the  
6 Department of Fish and Game (DFG) to prepare a Suisun Marsh Protection Plan ,  
7 including various restrictions on development within the Marsh, which "preserve the  
8 integrity and assure continued wildlife use" of Suisun Marsh.

9  
10 Although the majority of Suisun Marsh is privately owned, significant public  
11 ownerships are interspersed throughout the Marsh. The privately owned lands are  
12 predominantly managed to support migratory waterfowl which is a public trust resource  
13 and is readily accessible on adjacent public lands. This mosaic of public and private  
14 ownerships support a large open space area in proximity to vast urban areas, making it  
15 ideally suited for extensive wildlife viewing, hiking, canoeing, fishing, hunting, and other  
16 recreation opportunities.

17  
18 Approximately, 230 miles of exterior levees within the Marsh protect the 52,000  
19 acres of managed wetland habitat. These levees are a critical part of the physical  
20 configuration of the marsh which, in part, influences the salinity gradient in the region.  
21 They also contribute to preventing salt water intrusion into the Suisun and Delta, thus  
22 protecting local and regional water supplies.

23  
24 The Suisun Marsh has been the focus of recent attention in light of the significant  
25 decline of pelagic organisms in the Delta, including the threatened Delta smelt and food  
26 web organisms. Native fish declines have been observed in Suisun Marsh sloughs and  
27 channels, but not to the precipitous extent observed in the Delta. Some have

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 hypothesized that the large extent of functional marsh in Suisun has served as a refuge  
2 area for Delta smelt and there is great interest in taking actions to enhance those  
3 supportive attributes. Unfortunately, the available knowledge does not define those  
4 attributes in a way that can be translated into definitive actions. A planning process has  
5 been underway since 2001 to address conservation and restoration objectives for the  
6 marsh.

7  
8 The Habitat Management, Preservation, and Restoration Plan for Suisun Marsh  
9 (Suisun Marsh Plan) is being developed by The Suisun Marsh Charter Group Principal  
10 Agencies (Principal Agencies), a team of local, State and federal agencies, all focused  
11 on improving the health of Suisun Marsh. The Suisun Marsh Plan is intended to protect  
12 and enhance the vital Pacific Flyway plus existing wildlife and endangered species,  
13 maintain and improve levees, restore tidal marsh and other ecosystems, and possible  
14 improvements to water quality. The planning process will result in a draft programmatic  
15 EIS/EIR (PEIS/EIR), with action specific elements in spring 2008.

## 16 17 18 **Estuarine Habitats in Suisun Marsh**

19  
20 Encompassing 116,000 acres, the Suisun Marsh includes approximately 52,000  
21 acres of managed wetlands, 28,000 acres of upland grasses, 7,000 acres of tidal  
22 wetlands, and 30,000 acres of bays & sloughs. Managed seasonal wetlands include  
23 approximately 38,000 acres in 158 private ownerships and about 13,000 acres in land  
24 owned and managed by the Department of Fish and Game (DFG) and other  
25 organizations such as Suisun Resource Conservation District (SRCD) and Solano Land  
26 Trust. The Marsh environment includes a seasonally and geographically varying salinity  
27 gradient. The salinity gradient from Collinsville to Carquinez Strait varies with hydrology  
28 during the year and the north-south salinity varies primarily in response to northern creek  
29 flows.

## 30 31 **Importance of Suisun Marsh**

32 **Ecological Services.** The Marsh encompasses more than 10% of California's  
33 remaining natural wetlands and serves as the resting and feeding ground for thousands  
34 of resident and migratory waterfowl, shorebirds and neotropical migrants on the Pacific  
35 Flyway. The American Bird Conservancy identified Suisun Marsh as being significant for  
36 world bird conservation and officially designated it a globally important bird area. Suisun  
37 Marsh plays an important role in the Pacific Flyway by providing suitable habitat for early  
38 migrating waterbirds during periods of drought or at times when managed wetlands  
39 areas in the Central Valley are not flooded it is some of the only habitat available due to  
40 delayed harvest of agricultural fields in the Sacramento Valley and Delta region.



# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

**Table 1. Sensitive Species of Suisun Marsh**

In addition to the sensitive species listed here, the Suisun Marsh provides essential habitat for more than 221 bird species, 45 animal species, 16 different reptile and amphibian species, and more than 40 fish species (DWR 2000).

Plants or Plant Communities	Listing Status
Alkali milk-vetch	CNPS 1B
Delta tule pea	CNPS 1B
Mason's lilaeopsis	State Rare; CNPS 1B
Soft bird's beak	State Rare; Federal Endangered
Suisun Marsh aster	CNPS 1B
Suisun thistle	Federal Endangered; CNPS 1B
Reptile	
Western pond turtle	State CSC
Bird Species or Groups	
California black rail	State Threatened & Fully Protected
California clapper rail	State Endangered; Federal Endangered
Suisun song sparrow	State CSC
Saltmarsh common yellowthroat	State CSC
Northern harrier (nesting habitat)	State CSC
Great egret (rookery)	CDF Sensitive
Swainson's hawk	State Threatened
Western least bittern	State CSC
Fish Species	
Steelhead trout	Federal Threatened
Delta smelt	Federal Threatened; State Threatened
Green sturgeon	Federal Threatened; State CSC
Longfin smelt	State CSC
Sacramento splittail	State CSC
Winter-run Chinook salmon	Federal Threatened; State Threatened
Spring-run Chinook salmon	Federal Threatened; State Threatened
Fall-run Chinook salmon	State CSC
Pacific Groundfish	Essential Fish Habitat
Coastal Pelagics	Essential Fish Habitat
Chinook salmon habitat	Federal Critical Habitat; Essential Fish Habitat
Mammals	
Salt marsh harvest mouse	Federal Endangered; State Endangered
Suisun ornate shrew	State CSC

The brackish managed wetlands of the Suisun Marsh are considered important habitat for numerous waterfowl species, especially mallard, pintail, and widgeon. In dry years, these managed wetlands have supported more than one-quarter of the Central California waterfowl population. Managed wetlands provide essential habitat and foraging opportunities for resident and migratory herons, egrets, and shorebirds, with more than 20 species occurring in Suisun Marsh, along with many species of hawks, owls, and songbirds. Some of the mammal species that occur in Suisun Marsh managed areas include river otter, tule elk, and salt marsh harvest mouse (SMHM). Many small mammals (ornate shrew, broad-footed mole, western harvest mouse, California vole) benefit from upland habitat enhancement designed to increase waterfowl nesting success. Reptile species that can be found in the managed marsh include the western pond turtle and gopher snake. Wetlands also provide critical habitat components for species generally considered strictly terrestrial such as passerine birds

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

(song sparrows) and raptors (burrowing owls and harriers) that feed and/or breed in wetlands and spend some time in adjacent upland habitats. Maintaining and enhancing the current managed wetland acreage and wetland values is a goal set by the Central Valley Joint Venture 2006 Implementation Plan.

Tidal wetlands are comprised of vegetated marsh plains, and intertidal and subtidal channels, all of which are important habitat components. Channels provide habitat for endangered and sensitive fish species such as the delta smelt and Sacramento splittail and for outmigrating salmonids, and they support phytoplankton production which provides a food source to aquatic species (Lopez et al 2006). The vegetated tidal marsh plains provide habitat for native plant species such as soft bird's beak and Suisun thistle, nesting and foraging habitat for resident marsh bird species such as California clapper rail (CCR) and California black rail, and detritus contributions into the aquatic food web. The mudflat edges of tidal wetlands, found within channels at low tide and in some cases along bayward marsh edges, provide habitat for numerous invertebrates, and foraging habitat for shorebirds at low tide. Natural tidal wetlands along the Marsh perimeter, such as at Rush Ranch, have natural upland ecotones providing ecological connectivity to adjacent habitats, thereby supporting a broader range of wildlife species. Pannes provide habitats for invertebrates that support aquatic and avian communities.

Suisun Marsh supports the State's commercial and recreational salmon fishery by providing important tidal rearing areas for juvenile fish.

**Water Supply Services.** In addition to a narrative standard for protection of the brackish marsh, the SWRCB Water Quality Control Plan (WQCP) includes water quality standards for various locations in the marsh. Recognizing the seasonal variability for salinity these standards vary during the Control Season (October to May) as well as based on water year type. Actual salinity varies north to south as well as east to west based on local inflows, Delta outflow, and managed wetland operations. The implementation of the 1995 WQCP increased outflow requirements (See pages 11 & 12), resulted in lower salinity for the marsh, and reduced the need for operation of the Suisun Marsh Salinity Control Gates or for project reservoir releases to meet the marsh standards. The existing levee system is critical to maintain salinity conditions under existing operations and conserve water supply resources.

**Important trends over time and space.** Historically Suisun Marsh contained over 60,000 acres of brackish tidal wetlands. Construction of levees began around 1865, initially to enable livestock grazing but later for farming and managed marsh. Today there are approximately 7,000 acres of tidal wetlands remaining. This resulted in a loss of habitat for tidal-marsh dependent species and in fragmentation of the remaining tidal wetlands.



# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

Monitoring for the State and federally listed SMHM within Suisun Marsh began in 1987. SMHM had been found at all the areas selected for sampling. Surveys have shown that catastrophic events, such as fires or flooding, can have short term effects on SMHM populations in specific areas. However, the widespread population base in the Marsh enables the populations in these areas to recover after such events and it appears there is a healthy stable SMHM population within the entire Marsh.

Since the early 1950's up until 2002, DFG conducted monthly aerial waterfowl surveys in Suisun Marsh. Waterfowl survey ten-year averages (1990-1999) are shown in Appendix A. Recent annual survey numbers of waterfowl in Suisun Marsh are below the 1990-1999 ten-year average. Total numbers of wintering waterfowl were significantly higher from the mid-50's through mid-70's in Suisun Marsh, when northern pintail continental numbers were significantly higher, and met the North American Waterfowl Management Plans population objectives for this species.

University of California, Davis samples for fish in Suisun Marsh on a monthly basis. Between 1980 and 1994, there was a prolonged decline in native species abundance. However, there was a considerable increase in abundance of native species from 1995 to 2003. This increase in native fish abundance was driven primarily by increased catches of Sacramento splittail and more recently tule perch; although longfin smelt and delta smelt also increased in abundance during that period. Interagency Ecological Program monitoring identified declines in numerous pelagic fish in the Delta. Similarly, native species such as splittail and tule perch abundance declined somewhat in the Marsh during 2004 and 2005, and both smelt species declined to very low abundances. However, the decline of Delta smelt in Suisun Marsh was not as extreme as its decline in the Delta.

Introduced fish species may also affect native fish species in Suisun Marsh. Introduced species continued to increase in abundance in 2004 and 2005 as native species declined DFG and the Interagency Ecological Program Environmental Monitoring Program have monitored food web indicators: *Neomysis mercedis* (mysid shrimp) densities and chlorophyll *a* concentrations in Suisun Marsh since 1972 and 1976, respectively. *N. mercedis* catch has undergone a general downward trend since sampling began, with the most dramatic decrease following 1991. Densities have remained relatively low since then. Mysid shrimp abundance was extremely low in 2001 and has declined considerably through 2004.

*Chlorophyll a* concentrations, which serve as an indicator of phytoplankton abundance and the foundation of the food web, have shown an overall decline in Suisun Marsh since 1987. This decline has in part, been attributed to the efficient feeding habits of *Potamocorbula amurensis*, a suspension-feeding clam that invaded the San Francisco

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

Bay and Estuary in 1986. Chlorophyll a concentrations dropped off starting in 2000 and remained very low through 2002 with a slight increase in 2003.

Tule elk have benefited from past intensive management programs and are now thriving under current Marsh management strategies.

Observable subsidence in the Marsh is documented, to a limited degree, through benchmark elevation change observations. Restrictions on dredging activities result in the use of landward sources of borrow material such as pond bottoms within managed wetlands. Management practices in managed wetlands can result in the loss of organic matter and reduce soil elevation. The magnitude of local and regional subsidence in the Marsh has not been as great as that of the Delta but it is a growing concern. Suisun Marsh levees are generally smaller than Delta levees and continuing subsidence may result in reduced levee stability, increased risk of levee failure, and changes in the dynamics of the region.

## *Section 3. Technical Understandings of Suisun Marsh*

The body of knowledge about the physical, biological, and hydrologic conditions and processes of Suisun has been advancing rapidly in recent years. As part of developing the Suisun Marsh Plan, the Principal Agencies initiated preparation of a suite of conceptual models that have helped to draw from the body of science and engineering in the Marsh. In addition, a March 2004 Suisun Marsh Science Workshop helped to bring together much of this information and spur its further examination and refinement. Detailed conceptual models prepared to support the effort in developing the Suisun Marsh Plan include:

<b>Conceptual Models for the Habitat Management, Protection, and Restoration Plan for Suisun Marsh</b>	
<i>Ecosystem models</i>	<i>Process/Function models</i>
Tidal Marsh	Scalar Transport
Managed Wetlands	Methyl Mercury
Levees	Organic Matter
Subtidal aquatic	

These conceptual models capture the state of knowledge with respect to the key relationships, drivers and uncertainties in the Marsh. A summary of these elements are presented in the following text.

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

## 1 Key Relationships in the Suisun Marsh

2  
3 Suisun Marsh is a diverse region with interactions among several pivotal attributes  
4 including hydrodynamics, managed wetlands, tidal wetlands, levees, and salinity. Delta  
5 outflow, tidal flows, regional runoff, managed wetland discharges, and wastewater  
6 influence the contributions to and movement of water borne constituents. These  
7 constituents include salt, contaminants (such as methyl-mercury, metals and pesticides),  
8 primary production (such as phytoplankton and other forms of organic carbon),  
9 zooplankton, and fish (particularly during early life stages). All of these fundamental  
10 ecosystem constituents are exchanged between marsh channels, marsh plains, and the  
11 larger Sacramento-San Joaquin/San Francisco Bay-Delta estuary, making this region  
12 the critical link between the Delta and Bay for anadromous fish and important habitat for  
13 resident fish. The physical configuration of the levees, sloughs, and bays combined with  
14 Delta outflow, tidal flow, and northern creek inflows influence the natural salinity gradient  
15 along the west to east direction as well as the north-south salinity gradient. The X2  
16 salinity standard is measured at this location. It is the interaction among physical  
17 features and processes that define the largest contiguous estuarine brackish water  
18 wetland remaining in North America as an important nursery for fish, a wintering and  
19 nesting area for waterfowl of the Pacific Flyway, and essential habitat for plants, fish and  
20 wildlife, including listed and sensitive species.

21  
22 Tidal marshes are productive ecosystems with geomorphologic characteristics that  
23 are the foundation for the tidal marsh's biotic community. Tidal channels function as  
24 conduits for material exchange between the marsh and outside sloughs, and within the  
25 marsh. Channels provide habitat for aquatic plants and invertebrates, benthic  
26 invertebrates, fish, shore birds, waterfowl, and mammals such as river otters. Marsh  
27 plain soils are highly absorbent and can hold large volumes of water. Plants on the  
28 marsh plain reduce the velocity of flood waters, resulting in the deposition of suspended  
29 sediments present in the flood waters. They also provide habitat for a wide variety of  
30 species and can sequester contamination. Pannes, shallow depressions in higher  
31 elevations of the marsh plain that dry periodically, provide salt retention in soil,  
32 invertebrate production, forage and refuge habitat for many animals including shorebirds  
33 and waterfowl, and conditions for salt tolerant plants. The upland edge represents the  
34 transitional ecotone between high marsh plain/salt pannes and uplands and provides  
35 refugia for SMHM, connectivity to adjacent habitats, and conditions for a range of  
36 uncommon plant species.

37  
38 Managed wetlands are diked wetland areas managed primarily to provide wintering  
39 waterfowl habitat, but which also provide significant habitats which benefit many resident  
40 and migratory species, such as pheasants, waterbirds, owls, hawks, songbirds, small  
41 mammals (including the endangered SMHM) and tule elk. In managed wetlands,  
42 exterior levees (adjacent to sloughs and bays) are used in conjunction with interior

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 levees, ditches, and water control structures to retain and control water. Water control  
2 and habitat management is a critically important component in the effective management  
3 of diked wetlands to produce a desirable assemblage of brackish wetland plants, while  
4 preventing an increase in soil salinities, which limits wetland habitat diversity and quality.

5  
6 Methyl mercury is the most important form of mercury with respect to wildlife and  
7 human health concerns. Inorganic mercury can enter the Suisun Marsh from four  
8 primary pathways: the Sacramento-San Joaquin Delta, coastal marine embayments,  
9 local watershed runoff, and the atmosphere. Methyl mercury is produced through a  
10 process referred to as methylation in which inorganic mercury is converted through  
11 microbial activity into methyl mercury. There appear to be three key factors that may be  
12 critical to net methyl mercury production. These factors include total mercury  
13 concentration, speciation of the mercury, and level of activity of methylating bacteria.  
14 The level of activity of methylating bacteria is controlled by several other factors, but is  
15 generally greatest at the oxic-anoxic interface in the sediments with prolonged periods of  
16 wetting and drying. Hence, the area of the oxic-anoxic sediment interface in a given tidal  
17 or managed wetland should also be considered a primary factor in methyl mercury  
18 production.

19  
20 Several constituents such as organic matter (OM) play an essential role in  
21 sustaining food webs, mediating contaminant dynamics, and determining drinking water  
22 quality. The dominant sources of OM in Suisun Marsh are: (1) wetland vegetation and  
23 soils, (2) benthic and epibenthic algae, (3) phytoplankton, and (4) organic sediments  
24 resuspended into the water column.

25  
26 The majority of the Suisun Marsh, including wildlife habitat, is situated at or below  
27 mean tide elevation; the exception being 7,000 acres of tidal marsh, and levee and  
28 upland areas. Approximately 230 miles of exterior levees serve the primary function of  
29 flood control and habitat protection for Suisun Marsh managed wetlands. County and  
30 State lands, infrastructure, residences, and natural resources also depend on those  
31 levees for protection. In many instances levees serve multiple purposes within the  
32 Marsh, including the protection of numerous residences, roadways, Southern Pacific  
33 railroad, Amtrak, natural gas production and transmission lines, and wetland habitat.  
34 Levees are important components of this highly modified estuary and changes in the  
35 geometry of the Marsh due to levee failure or restoration initiatives will change the  
36 dynamics of the Estuary and salinity regimes.

## 37 38 **Important Uncertainties in the Suisun Marsh**

39 Identifying uncertainties is essential to moving forward in an informed manner.  
40 Important uncertainties are those that affect our ability to manage, maintain, enhance,  
41 and restore Marsh functions and to respond to planned and catastrophic events. The

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 following uncertainties are a sample of those identified within the Suisun Marsh  
2 conceptual models.

3  
4 There is some uncertainty about the direct benefits of tidal marsh restoration for  
5 native species, including soft bird's beak and Suisun thistle, because these types of  
6 habitats may also be suitable for introduced species, such as *Lepidium*, unless carefully  
7 designed and monitored.

8  
9 The extent and amount of subsidence in Suisun Marsh is not known with much  
10 accuracy. Similarly, overall sediment delivery to the northern reach of the Estuary is  
11 declining and the time period for sediment accumulation and/or peat formation on  
12 subsided lands being restored to tidal action is unknown.

13  
14 Effects of climate change and sea level rise on marsh habitats, both tidal and  
15 managed, have been defined only in general terms and timing is inherently uncertain.  
16 Both factors could have a major effect in the decades to come.

17  
18 The status of some native species such as the CCR in Suisun Marsh is poorly  
19 understood. Environmental or anthropogenic factors in the marsh or elsewhere in the  
20 San Francisco Bay region may affect movement and survival of the CCR. It is not fully  
21 known what these factors are, but they may include: fluctuations in water salinity, native  
22 or non-native mammal populations, non-native plant populations, and shifts in land use.

23  
24 Our ability to predict future trends in native and introduced species abundance is  
25 limited by a lack of thorough understanding as to how introduced species are affecting  
26 various communities in Suisun Marsh (and elsewhere in the estuary) and clearly the  
27 inherent random nature of invasive species establishment. The effort required to control  
28 introduced aquatic, plant and other species and their efficacies is not well established.

29  
30 The factors that influence methyl mercury production are numerous and not well  
31 understood, the internal cycling of mercury and methyl mercury within the Suisun Marsh  
32 has not been well documented, and the comparative loadings from tidal and managed  
33 marsh has not been established. Research is needed to understand the mercury cycling  
34 processes occurring in managed seasonal wetlands and the associated forcing  
35 functions.

## 36 37 **Science and Engineering Analyses and Contributions**

38 The diversity of the Suisun Marsh requires various engineering and scientific  
39 approaches to more fully understand the mechanisms and processes in this region. This  
40 includes computer simulations, field studies, and laboratory analyses. In addition to the  
41 sample of contributions below, the Bay-Delta Science Consortium sponsored a *Suisun*  
42 *Marsh Science Workshop* in March 2004 that over a two-day period included

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

presentations on a broad range of scientific topics pertinent to the management, maintenance, enhancement, and restoration of Suisun Marsh and its role in affecting Delta water quality. The *Synthesis Report* from this workshop is available online at [http://www.baydeltaconsortium.org/downloads/pdf/suisunmarsh\\_report\\_093004.pdf](http://www.baydeltaconsortium.org/downloads/pdf/suisunmarsh_report_093004.pdf).

Computer model simulations of Marsh hydrodynamics are used to assess salinity changes resulting from annual and seasonal variation in hydrology, levee failures, project operations, and proposed tidal marsh restoration. In conjunction with field studies, modeling is used to understand the estuarine hydrodynamics.

Status and trends monitoring within the Marsh include vegetation, SMHM, fish, and birds. These monitoring studies provide information on abundance and trends, and provide valuable information for managing the resources in the region. Surveys have periodically expanded to address additional research questions. For example, a genetics study on SMHM was prompted by early survey results which showed significant overlap, in both occupied habitats and morphological characteristics, between the endangered SMHM and the much more common western harvest mouse. The analysis was able to provide distinguishing morphological characteristics to identify SMHM clearly. Additional details on specific monitoring studies within Suisun Marsh can be found in Appendix A.

Research conducted to date has provided some information on the concentrations of mercury in the sediments of the Delta and Suisun; as well as an increased understanding of the processes involved in mercury cycling in tidal wetlands. Results of one study indicated that mercury methylation potential was greatest during winter, and decreased during spring and fall. Limited data available for managed wetlands has shown some instances of elevated methyl mercury levels. However, no formal studies have been undertaken or initiated on methyl mercury in managed wetlands.

The Suisun Marsh is an area used frequently by researchers and the Solano Land Trust Rush Ranch property was recently designated a part of the San Francisco Bay National Estuarine Reserve. In addition, SRCD has designated the Lower Joice Island for research opportunities.

## Drivers Affecting Change in the Suisun Marsh

There are a number of key natural and anthropogenic drivers that affect conditions and change in Suisun Marsh. Taking actions in Suisun or elsewhere that affect Suisun mandate a clear understanding of these drivers and how they manifest their effects on the Marsh. Salinity and water flow are the two most significant environmental drivers affecting all aspects of Suisun Marsh ecology. The Marsh's geometry is a strong



# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 environmental driver on salinity in the western Delta. These long-known facts are  
2 reflected in the suite of plans and policies pertaining to Suisun Marsh management.

3  
4 **Salinity** – Surface water salinity in combination with water flows are by far the two  
5 most important drivers affecting Suisun Marsh. All natural communities and all invasive  
6 species respond to the salinity regime, as salt is such a fundamental physiological factor  
7 in all living organisms.

8  
9 **Hydrology/Delta Outflow** – Runoff, Delta outflow and tidal flow are the primary  
10 drivers of the salinity gradient (both north to south and west to east) in the Marsh and the  
11 resulting salinity is one factor that influences salinity in the Delta-Suisun region.

12  
13 State Water Resources Control Board (SWRCB) Water Quality Control Plan  
14 (WQCP) (SWRCB 1995) – The requirement by the SWRCB to mitigate the effects of the  
15 Central Valley Project (CVP) and State Water Project (SWP) operations and other  
16 upstream diverters, preparation and implementation of the *Plan of Protection*, and  
17 establishment of salinity objectives for the Marsh play a significant role in the seasonal,  
18 annual, and long-term salinity variability of the region. (See Section 3 for additional  
19 details.)

20  
21 **Urbanization** – Encroaching urbanization has resulted in loss of seasonal and tidal  
22 wetlands, despite protections provided through the Suisun Marsh Preservation Act.  
23 Continuing threats exist as neighboring areas expand their development activities along  
24 the borders of the Marsh. Urbanization also increases pollutant loading and increases  
25 stormwater runoff by increasing the amount of impervious surfaces.

26  
27 **Subsidence** - Management practices within managed wetlands can result in ground  
28 subsidence. The continuing subsidence could reduce levee stability, increase the risk of  
29 levee failure, and change the dynamics of the region.

30  
31 **Sea Level Rise** – Projected long-term sea level rise could overwhelm the Suisun  
32 Marsh. While sea level rise in the past century has been addressed locally, moderate  
33 sea-level rise would result in more frequent levee overtopping, damages to habitat and  
34 infrastructure, and potential short-term changes in salinity. Large increases in sea-level  
35 rise would result in expanding the adjacent Grizzly and Honker Bay open water areas  
36 with even more devastating effects if diked lands are converted to open water.

37  
38 **Non-native Invasive Species** - Invasive species occur in all habitat types in the  
39 Marsh, including tidal marsh and managed wetlands. Invasive aquatic invertebrates,  
40 such as the Amur River Clam (*Potamocorbula amurensis*), have had a detrimental affect  
41 on the aquatic food web within Suisun Marsh. Future introductions of invasive aquatic  
42 species, such as the zebra or quagga mussels, also have the potential to further disrupt

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 food web processes in the Suisun ecosystem. Infestation by invasive plant species such  
2 as Pepper weed (*Lepidium latifolium*) can alter and degrade existing wetland and upland  
3 habitats. Non-native invasive terrestrial animals, such as feral cats, pigs, and Norway  
4 rats, are also of concern, especially those that prey on native species. These invasive  
5 species also have the potential to alter habitat structure or reduce populations of  
6 endemic species.

7  
8 **Funding** – Management and maintenance of nearly 40,000 acres in the Marsh is  
9 mostly privately funded. Management and maintenance of nearly 20,000 acres is  
10 funded through DFG and other organizations such as the Solano Land Trust. DWR and  
11 the U.S. Bureau of Reclamation (USBR) provide funding for operation and maintenance  
12 of project facilities and implementation of *Suisun Marsh Preservation Agreement*  
13 (SMPA) (DWR et al 1987) activities. The currently available funding from these sources  
14 is limited and inadequate to meet the needs to maintain, protect, and restore the  
15 beneficial resources in the marsh.

## 16 17 18 *Section 4. Institutions, Policies, Economics, and Financing,* 19 *including Important Conflicts and Incentives for Status Quo and for* 20 *Change*

21  
22 Actions in the Suisun Marsh are governed by a myriad of legislative and  
23 administrative policies and carried out by public agencies. In addition to the usual  
24 county, city and local agencies, several State and federal agencies have important roles  
25 in Marsh policies and actions Appendix B-D. The two most significant policies driving  
26 actions in the Marsh have been the 1977 Suisun Marsh Preservation Act and the  
27 SWRCB Water Rights Decision 1485 (Appendix B and C). The 1977 Suisun Marsh  
28 Preservation Act was passed by the State Legislature which declared that the Suisun  
29 Marsh represents a unique and irreplaceable resource to the people of the State and  
30 nation; and it is the policy of the State to preserve and protect a resource of this nature  
31 for the enjoyment of the current and future generations. The 1978 Water Rights Decision  
32 1485 (D-1485) (SWRCB 1978) set standards for water quality in the Marsh and required  
33 DWR and USBR to develop and implement a plan to meet these standards.

34  
35 In response to these requirements, DWR and USBR developed the *Plan of*  
36 *Protection*, which proposed construction of large facilities and distribution systems to  
37 meet salinity standards, and implementation of a water quality monitoring station  
38 network throughout the Marsh. In 1987 DWR, USBR, DFG, and SRCD signed the  
39 Suisun Marsh Preservation Agreement (SMPA), which requires DWR and USBR meet  
40 salinity standards, set a timeline for implementing the *Plan of Protection for the Suisun*  
41 *Marsh*, and delineates monitoring and mitigation requirements. This document was

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 amended twice, and more recently completely revised (Revised SMPA), and continues  
2 to be the governing policy for DWR and USBR actions in the Marsh.

## 3 4 **Economic Effects and Policy Funding**

5  
6 The wetland areas of Suisun Marsh are a mosaic of private and public ownerships,  
7 with the private landowners controlling over 60 percent. Private waterfowl hunting clubs  
8 which typically include ponded areas, vegetated areas, interior and exterior levees,  
9 water control structures, and clubhouse structures. Management and maintenance of  
10 these habitats and the levees protecting them are typically funded by private  
11 landowners. Costs of maintenance and management is often significant, particularly  
12 levee maintenance. Only 2.5 miles of exterior levees are eligible to participate in the  
13 DWR Delta Levee Subventions Program and approximately an additional 12 miles of  
14 exterior levees are eligible to participate in the Delta Levees Special Projects program,  
15 resulting in over 200 miles of Suisun Marsh exterior levees without any public financial  
16 assistance for levee maintenance and repairs. However, these levees protect local,  
17 regional, and State infrastructure, properties, and resources. There is a minimal levee  
18 maintenance program for 20 miles of Suisun levees. In recent flood events many  
19 Reclamation Districts and public agencies (SRCD and DFG) have received FEMA/OES  
20 flood damage repair funding assistance.)

21  
22 Under the SMPA, DWR and USBR are responsible for funding actions to mitigate  
23 for impacts caused by SWP diversions and CVP operations. In addition, DWR operates  
24 several physical facilities in the Marsh that were built as mitigation for SWP/CVP  
25 impacts. Costs for implementation of SMPA activities and operation and maintenance of  
26 the physical facilities is shared by DWR and USBR. DFG is responsible for all funding  
27 associated with management and maintenance of levees on the various units of the  
28 13,000 acre Grizzly Island Wildlife Area. Other organizations such as SRCD, US Navy,  
29 and Solano Land Trust are responsible for all funding associated with management and  
30 maintenance of about 5,000 acres.

## 31 32 **Conflicts and Change in Suisun Marsh:** 33 **The Suisun Marsh Charter and Planning Process**

34  
35 The Suisun Marsh is located within the Bay-Delta estuary which means that its  
36 water quality affects, and is affected by, California's two largest water supply systems,  
37 the federal CVP, and the SWP, and other upstream diversions. Policies in the Marsh  
38 have historically been based primarily on protection of water quality (salt concentration)  
39 for waterfowl habitat management. In recent years, this approach has led to conflict  
40 between endangered species protection and on-going management actions for  
41 economically important resources.

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 In an effort to balance the needs of the various resources and to reduce these  
2 conflicts, the CALFED Bay-Delta Program agencies, requested the agencies working on  
3 Marsh issues to develop an implementation plan for the Suisun Marsh Region. In  
4 response, DWR, DFG, SRCD, USBR, U.S. Fish and Wildlife Service (USFWS),  
5 California Bay-Delta Authority (CBDA), and NOAA's National Marine Fisheries Service  
6 (NMFS) formed a Charter Group focused on developing a regional plan that balances  
7 implementation of the CALFED Program, Revised SMPA, and other management and  
8 restoration programs within Suisun Marsh, in a manner responsive to the concerns of  
9 stakeholders and based upon voluntary participation by private landowners. These  
10 agencies (Principal Agencies) are currently developing the Suisun Marsh Plan and  
11 PEIR/EIS to protect and enhance the vital Pacific Flyway plus existing wildlife and  
12 endangered species, maintain and improve levees, restore its tidal marsh and other  
13 ecosystems, and improve its water quality. The Charter Group has also consulted other  
14 participating agencies, including the San Francisco Bay Conservation and Development  
15 Commission (BCDC), Regional Water Quality Control Board (RWQCB), SWRCB, the  
16 U.S. Environmental Protection Agency, and U.S. Army Corps of Engineers (USACE), in  
17 the development process.

18  
19 The Principal Agencies completed Public Scoping during late 2003 and early 2004  
20 to identify significant issues for analysis in a programmatic Environmental Impact  
21 Statement/Environmental Impact Report (PEIS/EIR) with specific action elements. The  
22 process has identified the following six goals for the Suisun Marsh Plan:

## Goals of the Habitat Management, Preservation, and Restoration Plan for the Suisun Marsh

24  
25  
26 **Goal 1:** Ecological Processes: Rehabilitate natural processes where feasible in Suisun  
27 Marsh to more fully support, with minimal human intervention, natural aquatic and associated  
28 terrestrial biotic communities and habitats, in ways that favor native species of those  
29 communities, with a particular interest in waterfowl and sensitive species.

30 **Goal 2:** Habitats: Protect, restore, and enhance habitat types where feasible in the Suisun  
31 Marsh for ecological and public values such as supporting species and biotic communities,  
32 ecological processes, recreation, scientific research, and aesthetics.

33 **Goal 3:** Levee System Integrity: Provide long-term protection for multiple Suisun Marsh  
34 resources by maintaining and improving the integrity of the Suisun Marsh levee system.

35 **Goal 4:** Non-Native Invasive Species: Prevent the establishment of additional non-native  
36 species and reduce the negative ecological and economic impact of established non-native  
37 species in the Suisun Marsh.

38 **Goal 5:** Water and Sediment Quality: Improve and/or maintain water and sediment quality  
39 conditions to provide good water quality for all beneficial uses and fully support healthy and  
40 diverse aquatic ecosystems in the Suisun Marsh; and to eliminate, to the extent possible,  
41 toxic impacts to aquatic organisms, wildlife, and people.

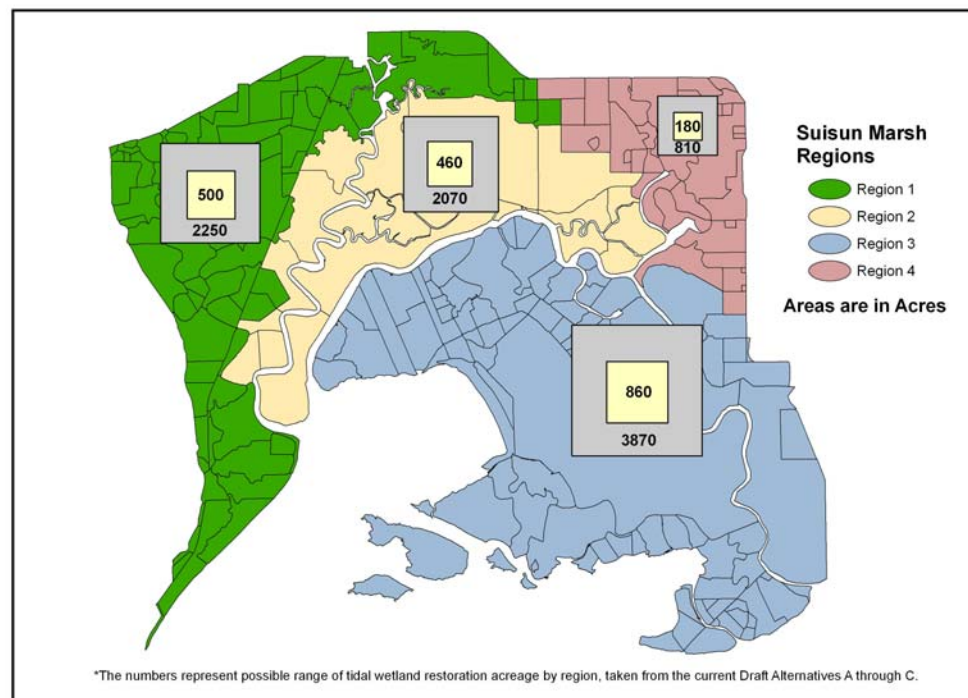
42 **Goal 6:** Public Use/Waterfowl Hunting: Maintain the heritage of waterfowl hunting and  
43 increase the surrounding communities' awareness of the ecological values of the Suisun  
44 Marsh.

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 The Principal Agencies meet monthly and a Writing Group and technical teams  
2 meet regularly to develop the PEIS/EIR and draft alternatives. A consultant has been  
3 retained to assist agency staff with technical evaluations, the impact analysis and  
4 preparation of the document. The draft PEIS/EIR is scheduled to be released in spring  
5 2008.

6  
7 The Suisun Marsh Plan will consider alternatives that will expand efforts and  
8 opportunities to restore tidal action to selected managed wetlands and promote natural  
9 riparian and wetland succession in Suisun Marsh. Shallow-water, wetland, and riparian  
10 habitats within the marsh and along the shorelines of the Bay will be protected and  
11 improved, where possible. Upland habitats adjacent to riparian and wetland habitats will  
12 also be protected and improved. Efforts will focus on restoring tidal habitats (e.g. by  
13 breaching exterior levees) and providing connectivity among habitat areas to aid in the  
14 recovery of species, such as the salt marsh harvest mouse, clapper rail, and black rail. .  
15 Providing natural habitat transitions between wetland habitats and adjacent upland  
16 habitats would provide habitat required by many special status plant species, protect



**Figure 2. Suisun Marsh Plan planning regions and proposed tidal marsh acreage targets.**

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 wetland habitats from disturbance, and provide area for the natural relocation of tidal  
2 wetlands with future sea-level rise. The enhancement of managed wetland habitats  
3 including the establishment of a strategic exterior levee maintenance program will  
4 maintain or enhance current habitat values to balance tidal marsh conversions.

5  
6 For the Suisun Marsh Plan, the marsh is divided into four planning Regions (Figure  
7 2) based on existing physical, habitat-related attributes, including topography, level of  
8 subsidence, and salinity. Table 2 shows existing habitat composition of the four planning  
9 regions. The Suisun Marsh Plan will consider four alternatives, including a No Action  
10 Alternative, with the primary difference among them being the extent of tidal marsh  
11 restoration and managed marsh enhancement (Table 3). The No Action Alternative  
12 includes the restoration of 1,000 acres tidal marsh, acknowledging the existing tidal  
13 restoration projects underway at Blacklock (Restored Fall 2006), Meins Landing, and Hill  
14 Slough West. All of the alternatives will include considerations of existing exterior levee  
15 maintenance and ongoing managed wetlands operations, continuation of the SMPA, and  
16 obtaining Corps of Engineers 404 permits for on-going maintenance.

17

**Table 2. Suisun Marsh Acreage by Habitat Type and Region  
as of June 11, 2006**

Habitat	Region 1	Region 2	Region 3	Region 4	Bays/Sloughs	Total
Tidal	2,066	1,966	2,949	644		7,624
Diked managed wetlands and uplands	11,888	7,266	28,628	2,968		50,750
Minor sloughs <sup>1</sup>	245	332	697	43		1,316
Developed <sup>2</sup>	164	12	45	2		223
Riparian	24	<1		0		24
Upland <sup>3</sup>	3,336	6,590	3,522	3,005		16,452
Bays and major sloughs <sup>4</sup>					25,664	25,664
Total acres	17,721	16,165	35,841	6,662	25,664	102,053 <sup>5</sup>

<sup>1</sup> Includes smaller sloughs not listed under "Bays and major sloughs" such as First and Second Mallard Branch, generally those that are navigable.

<sup>2</sup> Parking lots, major structures (excludes most homes and clubhouses which are included in the surrounding habitat types), railroads, etc.

<sup>3</sup> Above tidal inundation: Includes Potrero Hills, Kirby Hill, and acreage on the east and northwest edges of the Marsh.

<sup>4</sup> Includes Suisun and Honker bays to the Contra Costa county line, Grizzly Bay, Little Honker Bay; Montezuma, Cordelia, Cross, Denverton, Nurse, Suisun, and Hill sloughs.

<sup>5</sup> SRCD area = 102,053 acres (BCDC Plan of Protection = 116,000 and includes acres above Hwy 680 that are not in the SRCD Sphere of Influence)

18



# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1

Table 3. Acreage Targets for Suisun Marsh Plan Alternatives		
DRAFT ALTERNATIVES		
	Tidal Restoration	Managed Wetland Enhancement
Alternative A	2,000 – 4,000 acres	44,000 – 46,000 acres
Alternative B	4,000 – 6,000 acres	42,000 – 44,000 acres
Alternative C	6,000 – 9,000 acres	39,000 – 42,000 acres
No Action	1,000 acres	0 acres

2

3

4

5

6

7

8

The habitat restoration and enhancement targets vary according to region and by alternative (Table 4). Each alternative includes an aspect of levee maintenance, to achieve either the tidal marsh objectives or the managed marsh enhancement.

Table 4. Suisun Marsh Habitat Management, Preservation, and Restoration Plan PEIR/EIS Draft Tidal Restoration Targets by Alternative and by Region					
		Region			
	Tidal Restoration Target (acres)	1	2	3	4
No Action Alternative	943 acres	0	0	0	0
Alternative A	2,000–4,000	500 – 1,000	460 – 920	860-1,720	180 – 360
Alternative B	4,000–6,000	1,001 – 1,500	9,21 – 1,380	1,721 -2,580	361 – 540
Alternative C	6,000–9,000	1,501 – 2,250	1,381 – 2,070	2,581- 3,870	541 – 810

9

10

11

12

13

14

15

16

17

Diverting water from Suisun Marsh channels for managed nontidal wetlands and controlling the salinity of water entering the marsh through Montezuma Slough will continue, but with consideration for maintaining the natural hydrologic regime and salinity levels of the slough and marsh. Water quality standards specified in the 1995 Water Quality Control Plan may be re-evaluated based on hydrodynamic modeling and restoration alternatives being evaluated for the Suisun Marsh Plan. Flows into the northwestern marsh will be improved.

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

Suisun Marsh and Suisun Bay will function as high quality spawning and rearing habitat and an effective fish migration corridor. Improving marsh and slough habitats will benefit Chinook salmon, striped bass, Delta smelt, splittail, and other estuarine resident fish in the marsh and Suisun Bay. A healthy Suisun Marsh-Bay ecosystem will be an important link in the estuary food web by improving primary and secondary productivity. Marsh and Bay productivity will improve as freshwater inflow events increase in dry and normal years and acreage of tidal wetlands and associated tidal perennial aquatic habitat increases.

Completion and adoption of the Suisun Marsh Plan will be a significant change from the status quo. Under the status quo, individual agencies/stakeholders work independently for single resource management. This often results in a cumbersome and time-consuming process of 'negotiation' between agencies and stakeholders for each individual project. Several incentives exist for change from the status quo. A continuing decline in native sensitive species, particularly aquatic species has led to a concern for preserving and improving wetland habitats. However, previous regional planning efforts have failed to address these concerns. Past restoration efforts have been met with resistance from stakeholders with concerns about loss of current land use values and functions. Under the proposed Suisun Marsh Plan, habitat improvements, such as tidal marsh restoration, would be balanced by improvements to managed wetlands that benefit waterfowl. This balances the need of endangered species with the existing waterfowl habitat values. The levees of Suisun Marsh have been systematically excluded from funding either through the Delta Levee Subventions program, legislation, and/or the general bonds approved by voters. Under the proposed Suisun Marsh Plan maintaining and improving levee integrity is seen, by stakeholders and agencies, as a component of restoration and enhancement of ecosystem and wetland values, and contributing to the protection of Delta drinking water quality. Encroaching urbanization is also a concern for Marsh stakeholders. The Charter Group recognizes this concern and provides a forum for stakeholder participation in regional land use issues.

## Suisun Marsh Charter Outreach

A Suisun Marsh Charter website provides a centralized location to obtain information on Suisun Marsh, including the Public Scoping report and atlas of the various resources within the Marsh. In addition to a Suisun Marsh brochure, a newsletter of recent progress and items of interest is published regularly and distributed to the various stakeholders. Other outreach activities include making presentations at workshops, conferences, and at local agency meetings. The newsletters, presentations and brochure are available on the Suisun Marsh Charter website:  
<http://www.delta.dfg.ca.gov/suisunmarsh/charter/index.asp>

Existing policies, in combination with the majority of Suisun Marsh in private ownership, are the primary incentives for continuation with the status quo. Although

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

Charter Agencies have stated that all land acquisition will occur only through willing sellers, private landowners have expressed concern that change in current policies and agency objectives may lead to condemnation of private lands. In particular the concern is tidal marsh restoration by public agencies may lead to changes in historical wildlife distribution and negatively influence existing land use and economic value. There is also concern that change in policies may lead to increased urbanization.

## *Section 5. Monitoring Activities in Suisun Marsh*

The Suisun Marsh Plan will include an Adaptive Management Plan and performance measures to guide future monitoring and to allow for assessment of restoration effectiveness. This is a critical component of the restoration process because the science of tidal marsh is evolving. Projects implemented in the marsh under this plan will be based on the best available science and experience at the time, but monitoring and applying new understanding gained from each project is crucial to improving the effectiveness of subsequent actions.

DWR and USBR have various contractual and regulatory requirements for environmental monitoring in the Marsh. Under SWRCB D-1641 and Order WR 2000-02 (SWRCB 2002), DWR and USBR are required to monitor and report channel water salinity at various compliance and monitoring stations throughout the marsh. USBR and DWR developed the *Plan of Protection* to meet the SWRCB WQCP requirements in Suisun Marsh. In 1981, the USFWS issued a Section 7 Biological Opinion (USFWS 1981) for implementation of the *Plan of Protection for the Suisun Marsh*, which outlined specific conservation measures, including monitoring, to protect SMHM and its habitat. Additional monitoring requirements are included in BCDC and USACE permits for construction of the initial facilities, and associated USFWS biological opinions. The SMPA and companion *Suisun Marsh Monitoring Agreement* also include environmental monitoring. DFG has conducted waterfowl surveys in the marsh since 1950. Scientists at the University of California, Davis have conducted long-term fishery monitoring and the Interagency Ecological Program regularly samples. In addition to ongoing monitoring programs, site specific monitoring is conducted for individual projects. A description of the various monitoring programs is in Appendix A.

## *Section 6. References*

California Department of Fish and Game. 1999. The vegetation survey for the Suisun Marsh: Proposal for a new methodology. Draft Report. Sacramento (CA): Department of Fish and Game. 8 p + appendices.

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

- 1 California Department of Water Resources. 2000. Suisun Marsh monitoring program  
2 reference guide: Version 2. Sacramento (CA):California Department of Water  
3 Resources. 79 p.  
4
- 5 California Department of Water Resources. 1984. Plan of protection for the Suisun  
6 Marsh including environmental impact report. Sacramento (CA): California  
7 Department of Water Resources. 176 p + appendices.  
8
- 9 California Department of Water Resources, et al. 1987. *Suisun Marsh Preservation*  
10 *Agreement*. <http://iep.water.ca.gov/suisun/smpa/index.html> Summary  
11 [http://iep.water.ca.gov/suisun/smpa/RevisedSMPA\\_20JUN2005.pdf](http://iep.water.ca.gov/suisun/smpa/RevisedSMPA_20JUN2005.pdf) Full Agreement  
12
- 13 Lopez, C.B., Cloern, J.E., Schraga, T.S., Little, A.J., Lucas, L.V., Thompson, J.K., and  
14 Burau, J.R. 2006. Ecological values of shallow-water habitats: Implications for  
15 the restoration of disturbed ecosystems. *Ecosystems* 9:422-440.  
16
- 17 State Water Resources Control Board. 1978. Water Right Decision 1485, Sacramento-  
18 San Joaquin Delta and Suisun Marsh. Sacramento, California. 44 p.  
19
- 20
- 21 State Water Resources Control Board. 2000. Water Right Decision 1641 Implementation  
22 of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin  
23 Delta Estuary, Revised. Sacramento (CA): State Water Resources Control  
24 Board. 193 p.  
25
- 26 U.S. Geological Survey. 1997. Field methods for vegetation mapping [online document].  
27 Available from : <http://biology.usgs.gov/npsveg/fieldmethods.html> via the Internet.  
28
- 29 **Websites:**  
30
- 31 Suisun Marsh Plan <http://www.delta.dfg.ca.gov/suisunmarsh/charter/smip.asp>  
32 Suisun Marsh Technical Information <http://www.iep.ca.gov/suisun/>  
33

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

## Appendix A. Suisun Marsh Monitoring Activities

### Channel Water Monitoring

Data on salinity and tide stage are collected from a network of sites in Suisun Marsh channels. Currently, there are five SWRCB “compliance” stations (C-2/C-2B, S-64, S-49, S-42, and S-21) and two SWRCB baseline “monitoring” stations (S-35 and S-97) in the Marsh. An 11 additional monitoring stations (A-96, S-4, S-10, S-16, S-28, S-33, S-35, S-37, S-40, S-71, and S-72) are used to collect water quality data to support State and federal water quality and hydrodynamic modeling efforts for planning and restoration activities within the Sacramento-San Joaquin Delta and Suisun Marsh. The full compliment of monitoring stations is shown in Figure A-1.

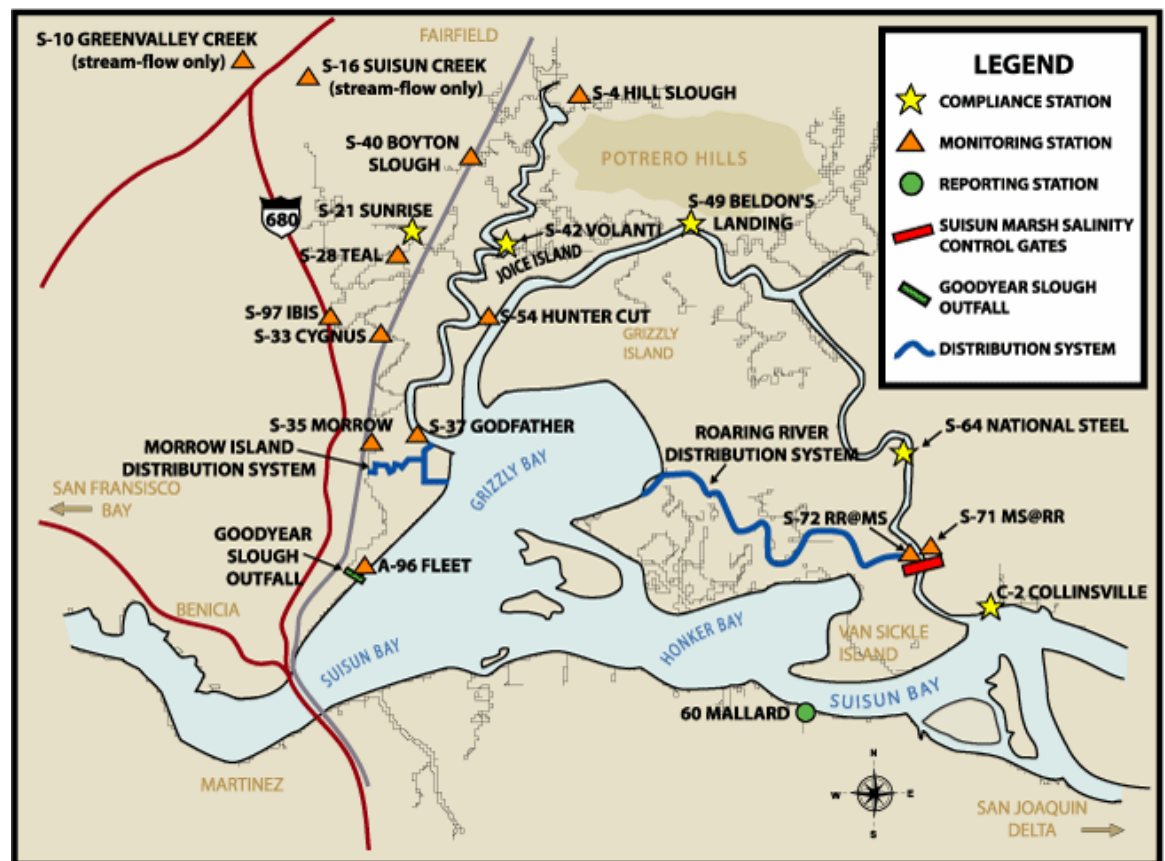


Figure A-1. Suisun Marsh Monitoring Station Map

### Vegetation Monitoring

Conservation measures outlined in the 1981 USFWS Biological Opinion required that vegetation monitoring be conducted in the Suisun Marsh. A monitoring plan was developed to assess the overall vegetative composition of Suisun Marsh using color aerial photography in conjunction with ground verification every third year. These surveys were completed in 1981, 1988, 1991, and 1994. In addition to monitoring

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 vegetation change across the Suisun Marsh, the Triennial Survey was supposed to  
2 monitor the acreage of preferred SMHM habitat. In 1999 the survey methodology was  
3 updated to better meet the goal of documenting changes in preferred habitat for the  
4 SMHM, as well as gather the vegetation information in such a way that it can be used for  
5 a variety of other purposes, including correlating management activities with vegetation  
6 changes, gathering data to support the use of a GIS format that will allow queries, and  
7 overlaying of additional information (such as soil type and hydrology), and a creating a  
8 base map for future studies. The vegetation mapping methodology used reflects the  
9 protocol for *Field Methods for Vegetation Mapping* supported by the National Park  
10 Service and Biological Resources Division of the US Geological Survey (USGS 1997).  
11 The value of this approach is a precise vegetation map with detailed classifications of  
12 vegetation. The specific methods of this monitoring plan are described in *The Triennial*  
13 *Survey for the Suisun Marsh Proposal for a New Methodology* (DFG 1999). Aerial  
14 surveys were conducted using this revised method in 1999, 2000, 2003 and 2006.

## 17 Salt Marsh Harvest Mouse Monitoring

18 SMHM monitoring of the SMHM Conservation Areas (Areas) began in 1987 as a  
19 collaborative effort between DFG and DWR. The primary objective of these first surveys  
20 was to determine presence of SMHM on each of the Areas, and was met by conducting  
21 annual SMHM surveys on each of the Areas. By the end of the 1999 survey season,  
22 SMHM had been found at all the Areas. Since 2000, the monitoring objectives have  
23 been expanded to the following:

- 24
- 25 • Obtain population indices for SMHM populations at each Conservation Area.
- 26 • Based on results of SMHM surveys, make recommendations for management of
- 27 the Conservation Areas.
- 28 • Monitor seasonal population fluctuations.
- 29 • Assess reproductive activity.
- 30

31 In addition to these objectives, surveys have periodically expanded to address  
32 additional research questions. The first of these, a genetics study, was prompted by  
33 early survey results which showed a significant overlap, in both occupied habitats and  
34 morphological characteristics, between the endangered SMHM and the much more  
35 common western harvest mouse. To clarify identification of the SMHM, DWR contracted  
36 with Cal Poly San Luis Obispo to conduct a genetic study of harvest mice in Suisun  
37 Marsh. From 1999 to 2003, collection of hair samples for genetic analysis became an  
38 additional objective of the monitoring.

39

40 Preliminary SMHM survey results led to a number of questions about habitat  
41 utilization. In 2002 a research study was designed to compare SMHM utilization of three  
42 habitat types in two wetland types (tidal, managed). The objectives of this intensive  
43 habitat study were to: (1) determine population indices and estimates, (2) assess  
Suisun Marsh



# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

density, survival, and reproduction, (3) examine patterns of habitat utilization and preference, and (4) determine suitability of the habitat present at each area and use this knowledge to guide the management of these areas. This intensive habitat study was conducted from 2002 to 2004 and the results are expected to be submitted for publication during 2007.

All objectives are addressed through the results of live-trap surveys which are usually conducted using 50-100 traps set for four consecutive nights. Vegetation sampling is also a usual part of the survey effort which is used in concert with the vegetation monitoring to evaluate acreage of preferred SMHM habitat.

## Aquatic Resources Monitoring

Under contract with DWR, the University of California, Davis has been conducting monthly adult and juvenile fish sampling since 1979 at 21 sites within 9 sloughs in the Marsh. The initial goal of the aquatic resources monitoring plan was to determine effects of the Suisun Marsh Salinity Control Gates (SMSCG) structure and operations on *Neomysis*, general fish abundance, striped bass eggs and larvae, juvenile striped bass, and chinook salmon. However, it is not possible to directly assess the impact of SMSCG on these resources, since the "control" or "background" condition for such an assessment (in other words, no gates) no longer exists. Therefore, in general, the data analyses attempt to address the question indirectly by comparing data collected prior to SMSCG installation with that collected after the SMSCG were installed in 1988.

The objectives of the general fish abundance study are to:

- Record long-term changes in fish populations due to environmental fluctuations and species introductions and add to the growing database on the Sacramento-San Joaquin Estuary.
- Monitor distribution and abundance of native species of the Suisun Marsh, especially delta smelt, longfin smelt, Chinook salmon and splittail.
- Track the movement of exotic species such as the shimofuri goby and the Asian clam.
- Track trends in diversity and abundance and determined habitat requirements of Suisun Marsh fishes and report the information annually.

## Bird Monitoring

Bird monitoring is conducted in the Marsh on both an ongoing basis and a project by project basis.

CCR surveys have been conducted to examine the current distribution of the CCR in the western Suisun Marsh, the easternmost portion of its range. Between 1995 and 1998 several agencies, including DWR, DFG, and USFWS, conducted reconnaissance breeding season censuses. DFG has been conducting CCR monitoring for the past five

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

years. Detections have been sporadic (zero in 2002, eight in 2003, one in 2004, zero in 2005, and five in 2006). However, given the variable history of CCR presence in the Suisun Marsh, Suisun may represent crucial habitat for this critically endangered subspecies of clapper rail.

DFG conducts monthly aerial waterfowl surveys in the Suisun Marsh during the waterfowl season. Observers estimate the numbers and species composition of waterfowl from an airplane which is flown 100 to 150 feet above ground at speeds of 90 – 105 miles per hour. Short-term factors such as weather and movements by waterfowl flocks, in addition to longer-term factors, such as land use changes, preclude the use of annual survey results for determining absolute population size. However, the aerial annual survey results are generally useful for identifying long-term trends in approximate numbers of waterfowl in the Marsh. Average monthly waterfowl numbers for the previous decade are shown in Table A-1.

**Table A-1. Average Waterfowl Counted in Suisun Marsh during Monthly Aerial surveys from Water Years 1990 through 1999**

Average Monthly Waterfowl Numbers, Water Years 1990 through 1999				
Month	Mallard	Northern Pintail	Total Ducks <sup>1</sup>	Total Waterfowl <sup>2</sup>
September	5,040	6,500	16,490	17,200
October	16,880	32,210	77,520	84,790
November <sup>3</sup>	12,910	32,530	88,480	96,510
December <sup>3</sup>	14,360	34,730	119,680	130,410
January	10,470	20,860	79,820	88,640

1. Includes all species of ducks observed during monthly surveys.

2. Includes all species of ducks, geese, swans, and coots observed during monthly surveys.

3. November and December averages are only 9-year averages.

Monitoring is also conducted on a project by project basis, including pre-construction monitoring for endangered species

## Tidal Marsh Restoration Monitoring

There are a discrete number of questions regarding design approaches and expected outcomes of tidal marsh restoration in Suisun Marsh. In October 2006, the SMPA agencies breached a 70-acre parcel in Suisun Marsh and restored it to tidal action. This project, the Blacklock Tidal Marsh Restoration Project, was the first SMPA tidal marsh restoration project. Monitoring at this site is currently being conducted to evaluate: methyl mercury production, SMHM use, vegetation colonization and succession, bird use, and sediment accretion. Monitoring can make a contribution toward answering several of these questions as efforts proceed to meet the CALFED goal of 5,000-7,000 acres of tidal marsh restoration. Currently, there is no funding in

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 place for Blacklock to monitor fish utilization, a core goal of tidal marsh restoration in  
2 Suisun.

3

## 4 **Marsh Topographic Surveys**

5 Elevation information for the Marsh is critical for determining current and potential  
6 land use strategies and opportunities, evaluating effects of levee breaches, evaluating  
7 potential effects of sea level rise, and re-aligning existing elevation benchmarks. DWR  
8 has conducted on-the-ground elevation surveys have been conducted by DWR at  
9 various locations throughout the marsh. In addition, in 2005 Marsh-wide Light-Imaging  
10 Detection and Ranging (LiDAR) surveys of the Marsh were conducted to develop a  
11 topographic map of the entire Marsh. An additional LiDAR survey conducted this year is  
12 being processed to refine the data obtained in previous survey results.

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

## 1 Appendix B. Important Policies Affecting Suisun Marsh Actions

2

Action	Year	Description
Four-Agency Memorandum of Agreement	1970	Called for studies necessary to obtain a thorough understanding of the requirements of fish and wildlife resources and evaluate alternative means of providing substitute freshwater supplies that would enable protection and enhancement of marsh waterfowl.
The Nejedly-Bagley-Z'Berg Suisun Marsh Preservation Act	1974	Required the BCDC to develop a plan for the Marsh and provides for various restrictions on development within Marsh boundaries.
Suisun Marsh Protection Plan, The Suisun Marsh Preservation Act of 1977 (AB 1717)	1976, 1977	Adopted the Suisun Marsh Protection Plan, which defines and limits development within primary and secondary management areas, and designates the BCDC as the State agency with regulatory jurisdiction of the Marsh and calls for the Suisun Resource Conservation District to have responsibility for water management in the Marsh.
SWRCB Water Rights Decision 1485	1978	Set salinity standards and required DWR and USBR to develop and fully implement a plan to meet the standards.
Plan of Protection for the Suisun Marsh	1984	Prepared by DWR and USBR in response to SWRCB D-1485. The plan proposed construction of large facilities and distribution systems in six phases to meet salinity standards. Two of the six phases were completed including the Initial Facilities (including Morrow Island Distribution System, Roaring River Distribution System, and Goodyear Slough outfall) in 1981 and the Suisun Marsh Salinity Control Gates in 1989.
Suisun Marsh Preservation Agreement	1987	A contractual agreement between DWR, USBR, DFG and SRCD. Requires DWR and USBR to meet salinity standards, sets a timeline for implementing the Plan of Protection, and delineates monitoring and mitigation requirements.
Bay-Delta Accord	1994	State and federal agencies, working with agricultural, environmental and urban stakeholders, reached agreement on water quality standards and related provisions that would remain in effect for three years.
SWRCB Water Quality Control Plan	1995–1998	Modified the Suisun Marsh salinity objectives. Modeling analysis by the Suisun Marsh Planning Program showed that changes in Delta outflow objectives and fish protection flow standards would be met most of the time at all Suisun Marsh compliance stations. Some standard exceedances would be expected in the Western Marsh that participants to the SMPA agreed could be mitigated by more active water control by landowners.
SWRCB Water Rights Decision 1641	1999	Updated salinity standards for Suisun Marsh. Increased outflow and salinity requirements for the Bay-Delta provided indirect benefits to the Suisun Marsh. SWRCB did relieve USBR and DWR of its responsibility in meeting salinity objectives at S-35 and S-97 in the western Marsh.

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

Action	Year	Description
CALFED Suisun Marsh Charter	2000	Intended to develop a regional plan that balances implementation of the CALFED Program, SMPA, and other management and restoration programs within Suisun marsh in a manner responsive to the concerns of stakeholders and based upon voluntary participation by private landowners.
Revised Suisun Marsh Preservation Agreement	2005	In 2005 the SMPA was revised due to significant events and changes in conditions, including: operation of the Suisun Marsh Salinity Control Gates, issuance of D-1641, and release of the CALFED Record of Decision,
BCDC = San Francisco Bay Conservation and Development Commission. USACE = U.S. Army Corps of Engineers DFG = California Department of Fish and Game DWR = California Department of Water Resources ECAT = Environmental Coordination and Advisory Team NMFS = National Marine Fisheries Service SMPA = Suisun Marsh Preservation Agreement SRCD = Suisun Resource Conservation District SWRCB = State Water Resources Control Board USBR = U.S. Bureau of Reclamation USFWS = U.S. Fish and Wildlife Service		

1  
2  
3  
4  
5

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

## *Appendix . State Water Resources Control Board Policy History with Respect to Suisun Marsh Water Quality*

In 1971, the Regional Water Quality Control Boards adopted, and the SWRCB approved, interim water quality control plans for the 16 planning basins in the State, including the Delta and Suisun Marsh. These regional water quality control plans marked the completion of the first phase of a comprehensive statewide planning effort. Subsequently, long-term standards for the Delta and Suisun Marsh were established in the regional plans for the Sacramento-San Joaquin Delta Basin and the San Francisco Bay Basin, which were approved by the SWRCB in 1975 and 1976, respectively. Meanwhile, in April 1973, the SWRCB adopted a water quality control plan, through Resolution 73-16, which supplemented the State water quality control policies for the Delta.

In August 1978, the SWRCB exercised its reservation of jurisdiction over the water right permits for the Central Valley Project and the State Water Project by adopting D-1485. At the same time, the SWRCB adopted the 1978 Delta Plan. Together, the 1978 Delta Plan and D-1485 revised existing standards for flow and salinity in the Delta's channels and ordered USBR and DWR to meet these standards by either reducing pumping, or releasing water stored in upstream reservoirs, or both. To address the continuing uncertainty associated with possible future project facilities and the need for additional information on the Estuary's ecosystem, the SWRCB committed to review the 1978 Delta Plan in 10 years.

In July 1987, the SWRCB began proceedings to reexamine water quality objectives for the Bay-Delta Estuary and consider how water right permits would be modified to meet the new objectives. In May 1991, the SWRCB adopted the 1991 Bay-Delta Plan with objectives for salinity, dissolved oxygen, and temperature. The 1991 Bay-Delta Plan was subsequently submitted to the U.S. Environmental Protection Agency (USEPA) for approval. In September 1991, the USEPA approved all of the salinity objectives for municipal, industrial, and agricultural beneficial uses, and the dissolved oxygen objective for fish and wildlife beneficial uses. The USEPA stated that the other fish and wildlife objectives were disapproved because of their failure to protect estuarine habitat and other fish and wildlife beneficial uses. As required under federal regulations (40 CFR 131.22) when a state does not adopt changes in standards recommended by the USEPA upon notification of approval or disapproval of a state's standards, the USEPA initiated promulgation of water quality standards for the Bay-Delta Estuary. In January 1994, the USEPA published draft standards for the Estuary in the Federal Register (59 Fed. Reg. 813).

The variability in salinity is reflected in the SWRCB WQCP objectives for Suisun Marsh which vary seasonally from October through May between 8 mS/cm and 19 mS/cm. Higher salinity objectives are defined in the WQCP in the Western Marsh from December through May during deficiency periods. In addition, during the summer months of June through August salinity can increase dramatically as outflow decreases since there are no salinity objectives during this period.



# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

## *Appendix D. Important Institutions and Their Roles in Suisun Marsh*

**California Bay-Delta Authority.** CBDA is the governing entity for the CALFED Bay-Delta Program, a collaboration among 25 state and federal agencies, that came together in 2000, with a mission: to improve water supplies in California and the health of the San Francisco Bay/Sacramento-San Joaquin River Delta. The Suisun marsh is an integral part of this program affecting water quality, levee system integrity and ecosystem values of the Bay-Delta system.

**Department of Fish and Game.** DFG has jurisdiction over actions in the marsh that affect State Endangered Species Act listed species. As a landowner in the Marsh, DFG is a party to the Revised SMPA. In addition, DFG owns approximately 13,000 acres in the Marsh which are managed as State wildlife management areas.

**Department of Water Resources.** DWR is responsible for conducting water quality monitoring and meeting SWRCB water quality objectives for the Marsh. DWR also maintains water conveyance facilities throughout the Marsh. DWR is a party to the Revised SMPA, along with USBR, DFG, and SRCD.

**National Marine Fisheries Service.** NMFS has statutory responsibility for the protection and enhancement of living marine resources, including anadromous fish and their supporting habitats, under the Endangered Species Act (ESA), 16 U.S.C. §1531 et seq., Magnuson-Stevens Fishery Conservation and Management Act (MSA), 16 U.S.C. §1801 et seq., Fish and Wildlife Coordination Act (FWCA) 16 U.S.C. §661 et seq., and Reorganization Plan No.4 of 1970, 84 Stat. 2090.

**Suisun Resource Conservation District.** In 1963, the SRCD was formed by private landowners in Suisun Marsh. The Suisun Marsh Preservation Act of 1977 designated SRCD to have the primary local responsibility for water management practices on privately owned land within the primary management area of Suisun Marsh. To carry out these responsibilities SRCD provides administrative, regulatory and technical functions that include representing landowner interest, both individually and collectively; obtaining environmental permits for routine maintenance activities; preparing wetland management plans for all private lands within the district; and providing technical expertise on issues related to Suisun marsh management. As the agency representing the landowners in the Marsh, SRCD is a party to the Revised SMPA.

**San Francisco Bay Conservation and Development Commission.** Under the Suisun Marsh Protection Plan, BCDC serves as the permitting agency for all major projects within the primary management zone and as an appellate body with limited functions in the secondary management area.

**State Water Resources Control Board.** The SWRCB is responsible for issuing Water Rights Decisions covering the Suisun Marsh. The current water rights decision (d-1641) sets water quality objectives for protection of the Marsh. The SWRCB requires that DWR and USBR submit monthly and annual water quality reports.

**U.S. Army Corps of Engineers.** The U.S. Army Corps of Engineers (USACE) has jurisdiction over any actions that occur in areas of the Suisun Marsh identified as

# Context Memorandum: Suisun Marsh

Iteration 1: August 20, 2007

1 jurisdictional wetlands. The USACE frequently issues permits to DWR and USBR for  
2 maintenance activities in the Marsh. In 1979 the USACE issued 404 Permit 12572-58 to  
3 DWR for construction and operation of the Initial Facilities. In 1986 the USACE issued  
4 404 Permit 16223E58 to DWR for construction and operation of the Suisun Marsh  
5 Salinity Control Gates (SMSCG).  
6 **U.S. Bureau of Reclamation.** USBR is a party to the Revised SMPA that  
7 implements the Suisun Marsh Plan of Protection. As compensation for Central Valley  
8 Project operations, USBR provides cost-share funding for all SMPA actions.  
9 **U.S. Fish and Wildlife Service.** The U.S. Fish and Wildlife Service has jurisdiction  
10 over actions in the Suisun Marsh that impact federal endangered species. The USFWS  
11 issued a Biological Opinion (1-1-81-F-130) in 1981 for the Suisun Marsh Management  
12 Plan, and Biological Opinion (1-1-86-F-27) in 1986 for construction of the SMSCG. Both  
13 opinions contained conservation recommendations requiring long-term monitoring of  
14 endangered species and their habitats in Suisun Marsh.